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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/729,960	12/09/2003	Masami Tomita	246440US2	2716

22850 7590 04/24/2007

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EXAMINER
DOTE, JANIS L

ART UNIT	PAPER NUMBER
1756	

SHORTENED STATUTORY PERIOD OF RESPONSE	NOTIFICATION DATE	DELIVERY MODE
3 MONTHS	04/24/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Notice of this Office communication was sent electronically on the above-indicated "Notification Date" and has a shortened statutory period for reply of 3 MONTHS from 04/24/2007.

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Office Action Summary	Application No.	Applicant(s)	
	10/729,960	TOMITA ET AL.	
	Examiner	Art Unit	
	Janis L. Dote	1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 February 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7 and 9-29* is/are pending in the application.

4a) Of the above claim(s) *14-29* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7 and 9-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *24 October 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *11/30/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. The examiner acknowledges the cancellation of claim 8 and the amendments to claims 1 and 13 filed on Oct. 24, 2006. Claims 1-7 and 9-29 are pending.

The "Amendment to the specification" section filed on Feb. 12, 2007, has been entered.

2. The "Amendment to the specification" section filed on Oct. 24, 2006, did not comply with 37 CFR 1.121 for the reasons discussed in the Notice of non-compliant amendment mailed on Jan. 12, 2007. Accordingly, that "Amendment to the specification" section has not been entered.

3. The replacement drawing sheets filed on Oct. 24, 2006, are acceptable.

4. Claims 14-29 have been withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on May 3, 2006.

5. The examiner has considered the US patent application listed in the "List of related cases" in the Information Disclosure Statements (IDS) filed on Nov. 30, 2006.

6. The objection to the drawings set forth in the office action mailed on Jul. 24, 2006, paragraph 5, has been withdrawn in response to the replacement-drawing sheet of Fig. 2 filed on Oct. 24, 2006.

The objections to the drawings set forth in the office action mailed on Jul. 24, 2006, paragraph 6, have been withdrawn in response to the amended paragraphs beginning at pages 79, 81-84, and 86, of the specification, filed on Feb. 12, 2007.

The objections to the specification set forth in the office action mailed on Jul. 24, 2006, paragraph 7, have been withdrawn in response to the amended paragraphs at pages 17, 30, 33, 71, 79, 81, 91, 94, 100, 105, and 106, and amended Table 1, of specification, filed on Feb. 12, 2007.

The rejections under 35 U.S.C. 103(a) of claims 1-5, 9, 11, and 13 over US 6,586,147 B2 (Iida) combined with the other cited prior art, set forth in the office action mailed on Jul. 24, 2006, paragraphs 15 and 16, have been withdrawn in response to the amendment to claim 1 filed on Oct. 24, 2006. That amendment added the limitations of now-cancelled claim 8 that the toner

particles further have a storage modulus G′ and a loss modulus G″, wherein the storage modulus G′ is in the range of $5.5x10^5$ Pa to $5.5x10^7$ Pa at 80°C and is in the range of $5.0x10^2$ Pa to $1.0x10^4$ Pa at 180°C, and a maximum of a loss tangent ($\tan\delta = G''/G'$) is in the range from 1.5 to 8.0 at temperature from 80°C to 130°C. For the reasons discussed in the office action mailed on Jul. 24, 2006, paragraph 17, Iida does not teach or suggest toner particles having the storage modulus at 180°C or the maximum loss tangent recited in instant claim 1. Nor is there enough information on the present record for a person having ordinary skill in the art to reasonably presume that the Iida toners have such a storage modulus and a loss tangent as recited in instant claim 1.

7. The examiner notes that the instant specification at page 38, line 16, to page 39, line 5, discloses that the parameter SF-1 recited in the instant claims is determined from the following equation:

$$SF\text{-}1 = [[MXLNG^2/AREA] \times (100\pi/4)],$$

where MXLNG is an "absolute maximum length of the toner particle and AREA is a projected area of the toner particle.

The examiner also notes that the instant specification at page 22, lines 3-7, defines the phrase "applied with oil in an

amount of 4 mg or less per A4 size" recited in instant claims 1 as meaning that "the application of oil to the surface of the belt heat-transfer medium is in the range of from 0 to 4 mg per A4 size, which includes the case that no oil is applied at all."

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claim 13 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Instant claim 13 is indefinite in the phrase "supplying said toner to a latent electrostatic image formed on a photoconductor and applying an alternating field thereby developing said latent image to form said toner image" (emphasis added) for lack of unambiguous antecedent basis for the term "said toner image" in claim 1, from which claim 13 depends. The toner image recited in claim 1 is fixed on a "recording medium." It is not clear how "said toner image" that is fixed on a

recording medium can be the toner image formed on a photoconductor.

Applicants' arguments filed on Oct. 24, 2006, have been fully considered but they are not persuasive.

Applicants assert that the amendment to claim 13 overcomes the rejection. However, for the reasons discussed above, the amendment did not overcome the rejection.

10. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

11. The indicated allowability of the subject matter recited in cancelled claim 8, which was added to claim 1, is withdrawn on further review of the reference US 2003/0027074 A1 (Emoto'074). Rejections based on the Emoto'074 follow.

12. Emoto'074 was published on Feb. 6, 2003, and has an effective filing date of Jul. 5, 2002. Both dates are prior to the instant application's filing date of Dec. 9, 2003. Thus, Emoto'074 qualifies as prior art under both 35 U.S.C. 102(a) and 35 U.S.C. 102(e). Accordingly, Emoto'074 also qualifies as prior art under 35 U.S.C. 103(c). Rejections based on Emoto'074 are set forth in infra.

13. Claims 1-7 and 9-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Emoto'074, as evidenced by applicants' admissions at page 32, lines 16-25, page 33, lines 10-14, and page 110, lines 1-2, of the instant specification (applicants' admission I), combined with: (1) WO 02/056116 (Emoto'116); (2) Japanese Patent 2000-267331 (JP'331); (3) US 2003/0113650 (Suwabe); and (4) US 5,797,070 (Waki).

See the USPTO English translations of JP'331 and Emoto'116 for cites.

Emoto'074 discloses an image forming method comprising the step of oil-less fixing a toner image on a recording medium with a fixing unit comprising an endless fixing belt **3** that is heated by a heating roller **1** comprising a heater **5** and a pressure roller **4**. Fig. 1 and paragraphs 0124-0127 and 0330. Because the fixing step requires that no oil be applied to the surface of the endless fixing belt **3**, it meets the limitation of applying "oil in an amount of 4 mg or less per A4 size" as recited in instant claim 1. See paragraph 7 supra.

Emoto'074 discloses that the toner image is formed with a toner comprising toner particles that comprise a colorant, a binder resin, and a wax as a releasing agent. Example 1 in paragraphs 0242-0245 and in Table 1 at page 21. The wax has a

melting point of 81°C and is present in an amount of 14% by weight based on the total weight of the toner particles. The wax amount of 14% by weight was determined from the information provided in example 1. The wax is dispersed as particles in the toner particles. The dispersed wax particles having a particle diameter of 0.1 to 2 μm accounts for 90% of all of the wax particles. The wax particles are dispersed in the toner particles as shown in Fig. 5, which shows that the wax particles are concentrated in the vicinity of the surface of the toner particles as observed with a transmission electron microscope (TEM). See paragraphs 0193-0195. The Emoto'074 wax meets the releasing agent limitations recited in instant claims 6 and 7. The binder resin comprises a urea-modified polyester resin and an unmodified polyester resin. The binder resin comprises a tetrahydrofuran-soluble component that exhibits a main peak molecular weight at 4000 and a number-average molecular weight of 2500. The binder resin has a Tg of 60°C and an acid number of 7 mg KOH/g. Paragraph 0150, lines 6-10; and Table 1. The Emoto'074 binder resin in example 1 meets the binder resin compositional limitations recited in instant claims 9-12. Emoto'074 further teaches that the toner can be made by using the process steps recited in the product-by-process limitation of instant claim 12. See paragraph 0216.

The Emoto'074 toner particles have a mean roundness of 0.96 and a weight average particle size of 6 μm. See Table 2 at page 21, example 1. The weight average particle diameter of 6 μm is within the range of 3.0 to 7.0 μm recited in instant claim 1. Emoto'074 also exemplifies toner particles having a weight average particle size of 5 μm, which is within the range of 3.0 to 5.0 μm recited in instant claim 2. See the toner in example 6 at paragraph 0267.

Emoto'074 does not disclose that its toner particles have the storage moduli and "maximum of loss tangent" as recited in instant claim 1.

According to the instant specification at page 32, lines 16-18, a "toner having a storage modulus G' of less than 5.5×10^5 Pa at 80°C may not be satisfactorily stored, although it may be fixed without problems." The instant specification at page 32, lines 19-25, teaches that if the storage modulus G' at 180°C is less than 5.5×10^2 Pa, the "toner . . . may not have sufficient elasticity to prevent hot offset"; if the storage modulus G' at 180°C is more than 1.0×10^4 Pa, the "toner . . . may have excessively high elasticity and may have a higher lowest fixing temperature, although it may exhibit sufficient hot-offset resistance." The specification at page 33, lines 10-14, further teaches if the maximum loss tangent is less

than 1.5, "the toner may not have sufficient glossiness"; and if the maximum loss tangent is more than 8.0, "the toner may not have satisfactory hot-offset resistance, although the toner may have sufficient glossiness." The instant specification at page 110, lines 1-2, states that "a suitable glossiness [determined at an incident angle of 60-degree using a glossmeter] is from about 10% to about 30%."

As discussed supra, the Emoto'074 toner in example 1 meets the toner compositional limitations recited in instant claims 1, 6, 7, and 9-12. According to Emoto'074, its fixing method using the toner of example 1 provides good image quality images, low temperature fixing, "hot offsetting properties in an oil-less use," and glossiness of color toner. Paragraph 0062, and Table 2 at page 21, example 1. Table 2 reports that when the toner image formed from the toner in example 1 is fixed with the belt fixing unit, the toner images can be fixed with a "lower-most temperature for toner fixing" of 140°C and the fixed toner images have a "60-degree gloss" of 10% or more at 150°C. The toner has a "hot offsetting temperature" of 220°C and a thermal storability rated "B." See paragraphs 0314-0325. These appear to be the same properties sought by applicants. Because the toner in example 1 of Emoto'074 meets the toner compositional limitations recited in the instant claims; and because the toner

appears to have the properties sought by applicants, it is reasonable to presume that the Emoto'074 toner has the storage moduli and maximum loss tangent properties recited in instant claim 1. The burden is on applicants to prove otherwise. In re Fitzgerald, 205 USPQ 594 (CCPA 1980).

Emoto'074 does not disclose that its toner particles have the particle distribution ratio of the weight-average particle diameter (Dv) to the number-average particle diameter (Dn), i.e., Dv/Dn, of 1.00 to 1.25 recited in instant claim 1. Nor does Emoto'074 disclose that its toner particles have an average shape factor SF-1 of 100 to 150 and contain particles having a shape factor SF-1 of 160 or more in an amount of 10% by number or less as recited in instant claim 1.

Emoto'116 teaches toner particles having a preferred weight-average particle diameter (Dv) of 3.0 to 6.0 μm and a particle distribution ratio Dv/Dn of 1.00 to 1.15. See USPTO translation, page 14, lines 14-16. According to Emoto'116, the toner provides high quality images with high resolution. USPTO translation, page 14, lines 8-10. The particle distribution ratio Dv/Dn is within the ranges recited in instant claims 1 and 3. The lower endpoint, 3.0 μm, of the preferred weight average particle diameter range of 3.0 to 6.0 μm is the same as the lower end point of the range of 3.0 to 5.0 μm recited in

instant claim 2. Accordingly, the prior art appears to recognize the weight average toner particle size and toner particle distribution ratio Dv/Dn as result-effective variables. The variation of a result-effective variable is presumably within the ordinary skill of a person in the art.

As discussed above, the Emoto'074 toner particles have a mean roundness of 0.96. According to Emoto'074, if the mean roundness is smaller than 0.96, the toner particles are far from spheres. Paragraph 0238, lines 4-5. Waki discloses that it is advantageous for spherical toners to have a shape factor SF-1 of 100 to 180, preferably from 100 to 140, most preferably from 100 to 130. Col. 8, lines 8-27. The Waki shape factor SF-1 is determined in the same manner as recited in the instant claims. See paragraph 7 above. The preferred and most preferred SF-1 ranges meet the SF-1 ranges recited in instant claims 1 and 4, respectively. Waki discloses that the shape factor SF-1 represents the degree of sphericity of the toner, and a shape factor SF-1 closer to 100 means that the shape of the toner particles is closer to a sphere. Col. 8, lines 29-32. Thus, it appears that the shape factor SF-1 and the average roundness required by Emoto'074 both relate to the spherical shape of the toner particles.

JP'331 and Suwabe each teaches toner particles having an

average shape factor SF-1 of 125-140. See the USPTO translation of JP'331, claim 1, and paragraphs 0016, item (ii). Also see Suwabe, paragraphs 0100 and 0101. Both the JP'331 and Suwabe shape factors SF-1 are determined in the same manner as recited in the instant claims. Compare the USPTO translation, paragraph 0016, lines 7-8, and Suwabe, paragraph 0101, with paragraph 7, supra. The references shape factor SF-1 range of 125 to 140 is within the SF-1 range recited in instant claim 1 and within the preferred ranges disclosed by Waki. The SF-1 range of 125 to 140 overlaps the range of 100 to 130 recited in instant claim 4. The lower endpoint, 125, of the range 125 to 140 is within the shape factor range recited in instant claim 4.

JP'331 further teaches that its toner particles comprise particles having a shape factor SF-1 of 120 or less in an amount of 20% by number or less and particles having a shape factor of 150 or more in an amount of 20% by number or less. See the USPTO translation, claim 1, items (d) and (e), and paragraph 0016, items (iv) and (v).

According to JP'331, if the shape factor SF-1 exceeds 140, the "fluidity of the toner deteriorates, and there is an adverse influence on the transfer property from the initial stage." USPTO translation, 0025, lines 4-6. According to Suwabe, if the shape factor SF-1 exceeds 140, the fluidity of the toner is

lower, which "adversely affects the transferability from the start." Suwabe also teaches that if the shape factor SF-1 is less than 125, inferior toner cleaning occurs. Suwabe, paragraph 0102.

JP'331 further teaches that if the amount of toner particles having an SF-1 of 120 or less exceeds the amount of 20% by number, "it is impossible to maintain a good cleaning property for a long period of time." If the amount of toner particles having an SF-1 of 120 or less exceeds the amount of 10% by number, "the cleaning property becomes poor, and printer contamination and deterioration in reliability take place." USPTO translation, paragraph 0026, lines 2-3, and paragraph 0029, lines 1-3. JP'331 also teaches that if the amount of toner particles having an SF-1 of 150 or more exceeds the amount of 20% by number, "it is impossible to maintain good transfer characteristics for a long period of time." If the amount of toner particles having an SF-1 of 150 or more exceeds the amount of 10% by number, "unevenness of transfer may take place in the transfer operation." USPTO translation, paragraph 0026, lines 5-6, and paragraph 0029, lines 5-7. JP'331 exemplifies toner particles having an SF-1 of 126 and comprising particles having an SF-1 of 120 or less of 12.5% by number and particles having an SF-1 of 150 or more of 5.2% by

number. See the USPTO translation, Table 1, example 9. According to JP'331, the toner in example 9 provides good quality images "without unevenness in transfer" and "voids." USPTO translation, paragraph 0120 and Table 2, example 9.

Accordingly, the prior art appears to recognize the shape factor SF-1, the amount of particles having a shape factor SF-1 of 120 or less, and the amount of particles having a shape factor SF-1 of 150 or more as result-effective variables. The variation of a result-effective variable is presumably within the ordinary skill of a person in the art.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings of Emoto'116, Waki, JP'331, and Suwabe, to adjust, through routine experimentation, the particle size and the shape of the Emoto'072 toner particles in example 1, such that the resultant toner particles have the roundness required by Emoto'072, the weight-average particle size and particle distribution ratio Dv/Dn as recited in instant claims 1-3, the shape factor SF-1 recited in the instant claims, and comprise the amount of particles having a shape factor SF-1 of 150 or more as recited in instant claims 1 and 5. It would have also been obvious to that person to use the resultant toner particles in the image forming method disclosed by Emoto'074. That person would have had a reasonable expectation of

successfully obtaining an image forming method that provides fixed high quality images with high resolution and with no "unevenness of transfer" and "voids."

14. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Emoto'074, as evidenced by applicants' admission I combined with: (1) Emoto'116; (2) JP'331; (3) Suwabe; and (4) Waki, as applied to claim 1 above, further combined with US 6,641,967 B2 (Takiguchi).

See the USPTO translations of JP'331 and Emoto'116 for cites.

Emoto'074, as evidenced by applicants' admission I, combined with the other cited references renders obvious an image forming method as described in paragraph 13 above, which is incorporated herein by reference.

According to Emoto'074, in monochromatic image-forming devices or in color-image forming devices, the toner image on a recording medium is usually formed by forming a latent image on a photoconductor with an image-forming unit, developing the latent image with a developing unit that comprises a toner to form a toner image, and transferring the toner image on the photoconductor to a recording medium. Paragraphs 0004-0005. Emoto'074 further teaches that its toner can be used in a two-

component developer comprising the toner and a magnetic carrier. Paragraph 0236, lines 1-3.

Emoto'074 does not disclose that the toner image on a recording medium used in its image forming method is formed by developing a latent image with a toner by applying an alternating field as recited in instant claim 13.

Takiguchi discloses a method of developing an electrostatic latent image with a magnetic brush formed from a developer comprising a particular magnetic carrier and a toner having a weight average particle size of 1 to 9 μm. As discussed in paragraph 13 above, the toner particles in example 1 of Emoto'074 have a weight average particle size of 6 μm, which meets the Takiguchi particle size requirement. Takiguchi teaches that the latent image is developed in a developing zone under the application of an alternating field. Col. 6, lines 7-15 and 42-62; col. 10, lines 60-65; col. 14, lines 34-37; and col. 15, lines 28-33. According to Takiguchi, the alternating field prevents the occurrence of carrier adhesion on the photoconductor. Col. 15, lines 27-33. Takiguchi further teaches that its developing method provides high quality images with less fog and toner scatter. Col. 6, lines 7-10.

It would have been obvious for a person having ordinary

skill in the art, in view of the teachings in Takiguchi, to form a toner image on a recording medium by forming an electrostatic latent image on a photoconductor, developing said latent image under the application of an alternating field with a magnetic brush comprising the particular carrier taught by Takiguchi in combination with the toner rendered obvious over the combined teachings of Emoto'074, Emoto'116, Waki, JP'331, Suwabe. It would have also been obvious for that person to use the resultant toner image on a recording medium as the toner image on a recording medium in the image forming method disclosed by Emoto'074. That person would have had a reasonable expectation of successfully obtaining an image forming method that provides recording sheets with high quality fixed toner images with less fog and toner scatter.

15. Claims 1-5, 9, 10, and 13 are rejected under 35 U.S.C. 103(a) as unpatentable over US 6,235,441 B1 (Tanikawa) combined with: (1) Emoto'116; (2) JP'331; (3) Suwabe; (4) Waki; and (5) US 2001/0003562 A1 (Hachisuka). See the USPTO translations of JP'331 and Emoto'116 for cites.

Tanikawa discloses an image forming method comprising the step of fixing a toner image on a recording medium with a fixing unit comprising a pair of rollers that comprise a fixing roller

and a pressure roller. The toner image on the recording medium is formed by forming an electrostatic latent image on a photoconductor, developing the latent image with a monocomponent developer comprising a toner conveyed by a developer-carrying member, and transferring the developed toner image to the recording medium. The latent image on the photoconductor is developed with the developer while a developing bias voltage comprising an alternating voltage is applied to the developer-carrying member. Said development step meets the development step limitation recited in instant claim 13. According to Tanikawa, said development step increases the density or gradational characteristics of the developed image. Col. 74, lines 39-48; col. 75, lines 27-64; Figs. 3 and 5; reference claim 55; and example 57 at cols. 109-112 and in Tables 12-1 and 13-1 at cols. 115 and 117, respectively.

The toner image in example 57 of Tanikawa is formed with a toner comprising toner particles having a weight average particle size D4 of 8 μm. Col. 110, line 45. The Tanikawa toner particles comprise a colorant, a binder resin, and a wax as a releasing agent. Col. 109, line 65, to col. 110, line 36. The binder resin has an acid number of 6.8 mg KOH/g and a glass transition temperature of 53.4°C. See Table 12-1, example 57. The Tanikawa binder resin in example 57 meets the binder resin

limitations recited in instant claims 9 and 10. The toner particles further have a storage modulus G′ at 80°C of $2.0x10^5$ Pa and a loss tangent (tanδ) of 1.7 at 80°C. See Table 12-1 at col. 115, example 57, and Fig. 6. The value of the storage modulus G′ at 80°C was determined from the graph in Fig. 6. (The value of the G′ at 80°C of $2.0x10^4$ Pa in Table 12-1 appears to be in error. From the graph in Fig. 6, G′ at 80°C is readily determined to be 2×10^5 Pa. In addition, Tanikawa at col. 11, lines 34-40, teaches that the toner preferably has a G′ at 80°C in the range of $1.0x10^5$ to $2.0x10^6$ Pa to exhibit excellent fixability and releasibility from the fixing member.) The storage modulus G′ and the loss tangent values at 80°C are within the storage modulus G′ and loss tangent ranges recited in instant claim 1. From the graph in Fig. 6, the loss modulus G″ at 180°C is readily determined to be about 9×10^2 Pa, which is within the range of $5.0x10^2$ to $1.0x10^4$ Pa recited in instant claim 1.

Tanikawa does not explicitly disclose that its fixing step is an oilless fixing step. However, Tanikawa at col. 1, line 65, to col. 2, line 5, teaches the use of a fixing device comprising a device for supplying an offset-preventing liquid, such as silicone oil, "still involves a problem of requiring a complicated fixing device leading to increase in size of the

entire [image forming] apparatus." In addition, the fixing device shown in Fig. 5 of Tanikawa does not include a device for supplying an offset-preventing liquid. In example 57, Tanikawa discloses that there was little toner attachment found on the fixing roller cleaning web. See col. 112, lines 40-45 and Table 13-1, example 57. Thus, based on the disclosure in Tanikawa, it is reasonable to conclude that the Tanikawa fixing step is an oilless fixing step. The burden is on applicants to prove otherwise.

Because the Tanikawa fixing step appears to be an oilless fixing step that requires that no offset oil be applied to the surface of the fixing roller, it meets the limitation applying "oil in an amount of 4 mg or less per A4 size" as recited in instant claim 1. See paragraph 7 supra.

Tanikawa does not exemplify toner particles having the weight average particle size (Dv) of 3 to 7 μm and the particle distribution ratio of the weight-average particle diameter (Dv) to the number-average particle diameter (Dn), i.e., Dv/Dn, of 1.00 to 1.25 recited in instant claim 1. Nor does Tanikawa disclose that its toner particles have an average shape factor SF-1 of 100 to 150 and contain particles having a shape factor SF-1 of 160 or more in an amount of 10% by number or less as recited in instant claim 1.

Emoto'116 teaches toner particles having a preferred weight-average particle diameter (Dv) of 3.0 to 6.0 μm and a particle distribution ratio Dv/Dn of 1.00 to 1.15. The discussion of Emoto'116 in paragraph 13 above is incorporated herein by reference.

JP'331 and Suwabe each teaches toner particles having an average shape factor SF-1 of 125-140. JP'331 further teaches that its toner particles comprise particles having a shape factor SF-1 of 120 or less in an amount of 20% by number or less and particles having a shape factor of 150 or more in an amount of 10% by number or less. The discussions of Suwabe and JP'331 in paragraph 13 above are incorporate herein by reference.

Waki discloses that spherical toner particles that have a shape factor SF-1 of 100 to 180, preferably 100 to 140, can be produced by heating a pulverized toner prepared by melting, blending, pulverization, and classification; or by treating a pulverized toner "by application of impact to the toner particle surface." Waki, col. 8, lines 9-27 and 50-56. The toner in example 57 of Tanikawa is obtained by a melt kneading-pulverization method.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings of Emoto'116, JP'331, Suwabe, and Waki, to adjust, through routine experimentation,

the toner shape of the Tanikawa toner particles in example 57 by further processing the toner particles as taught by Waki, and the particle size of the Tanikawa toner particles, such that the resultant toner particles have the weight-average particle size and particle distribution ratio Dv/Dn as recited in instant claims 1-3, the shape factor SF-1 recited in the instant claims, and comprise the amount of particles having a shape factor SF-1 of 150 or more as recited in instant claims 1 and 5. It would have also been obvious to that person to use the resultant toner particles in the image forming method disclosed by Tanikawa. That person would have had a reasonable expectation of successfully obtaining an image forming method that provides fixed high quality images with high resolution and with no "unevenness of transfer" and "voids."

Tanikawa does not exemplify a fixing unit comprising a belt heat-transfer medium as recited in instant claim 1. As discussed supra, Tanikawa exemplifies the use of a fixing unit comprising a fixing roller and a pressure roller.

According to Hachisuka, in a conventional fixing unit, such as that exemplified by Iida, the rollers form a nip in which the recording sheet comprising the toner image is conveyed to fix the image. In such a heat roller mechanism, the "melted toner is inevitably separated from the fixing roller before it is

sufficiently cooled off. Accordingly, an offset phenomenon is prone to be caused in which the toner is erroneously deposited on the surface of the fixing roller." Hachisuka, paragraph 0005. Hachisuka discloses that in a belt-type fixing mechanism, the "fixing belt . . . has a far smaller heat capacity than the fixing roller type fixing mechanism and, therefore, the fixing belt can rapidly be cooled off during the time when it [the toner image on the recording sheet] is moved to pass through the fixing nip, resulting in an accurate prevention of the offset phenomenon." Paragraph 0008.

Hachisuka teaches a fixing unit that comprises a fixing roller **402**, a heat roller **406**, which is internally heated with a halogen heater **404**, and a seamless fixing belt **408**, which is held in tension between the fixing roller **402** and the heat roller **406**. The fixing unit further comprises a pressure roller **412**. Fig. 5 and paragraph 0099. The heat roller **406** heats the fixing belt **408**. The recording sheet with the toner image is conveyed through a first nip **N1** formed between the fixing belt **408** and the pressure roller **412** and then through a second nip **N2** formed between the fixing roller **402** and the pressure roller **412** via the fixing belt **408**. Paragraph 0101. The Hachisuka fixing unit meets the fixing unit elements recited in instant claim 1. According to Hachisuka, its fixing unit is

capable of effectively performing an image fixing process. Paragraph 0003. Hachisuka further teaches that because the first fixing nip **N1** has a comparatively lower fixing pressure, the recording sheet is smoothly conveyed through nip **N1** without wrinkling. Paragraph 0108. According to Hachisuka, "[s]ince heat capacity of the fixing belt **408** is relatively low, the fixing belt **408** rapidly decrease its temperature at an area around the exit of the fixing process area **N2**. This causes an advantageous cooling effect by which the fixing belt **408** is protected from an offset problem in which the fixing belt **408** is deposited by the toner." Paragraph 0109.

It would have been obvious for a person having ordinary skill in the art to use the Hachisuka fixing unit as the fixing unit in the image forming method rendered obvious over the combined teachings of Tanikawa, Emoto'116, Waki, JP'331, and Suwabe. That person would have had a reasonable expectation of successfully obtaining an image forming method that provides recording sheets with fixed toner images without offset and without wrinkles.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Janis L. Dote whose telephone number is (571) 272-1382. The examiner can normally be reached Monday through Friday.

If attempts to reach the examiner by telephone are

unsuccessful, the examiner's supervisor, Mr. Mark Huff, can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry regarding papers not received regarding this communication or earlier communications should be directed to Supervisory Application Examiner Ms. Claudia Sullivan, whose telephone number is (571) 272-1052.

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JLD
Apr. 17, 2007

Janis L. Dote
JANIS L. DOTE
PRIMARY EXAMINER
GROUP ~~1600~~ 1700

filed 10/24/06

IN THE DRAWINGS

The attached sheets of drawings include changes to Figs. 2D and 5. These sheets, which include Fig. 2D and 5, replaces the original sheets including Figs. 2D and 5.

OK to enter 4/11/07 J. Dietz

Attachment: Replacement Sheets